

What is claimed is:

1. A bi-modal electrophoretic composition comprising a dispersion of two types of particles of substantially the same polarity and substantially the same electrophoretic mobility or switching rate in a dielectric solvent or solvent mixture
5 wherein one type of said particles is the primary pigment particles and the other type is the filler particles of a smaller size.

2. The composition of Claim 1 wherein said primary pigment particles is formed of an organic or inorganic pigment.

10 3. The composition of Claim 1 wherein said primary pigment particles are white.

4. The composition of Claim 1 wherein said primary pigment particles are colored.

5. The composition of Claim 3 wherein said primary pigment particles are TiO_2 , BaSO_4 , ZnO or hollow particles.

15 6. The composition of Claim 5 wherein said primary pigment particles are TiO_2 particles.

7. The composition of Claim 1 wherein the particle size or diameter of the primary pigment particles is in the range of about 0.1 to about 10 microns.

20 8. The composition of Claim 7 wherein the particle size or diameter of the primary pigment particles is in the range of about 0.2 to about 2 microns.

9. The composition of Claim 1 wherein said primary pigment particles are coated or microencapsulated.

25 10. The composition of Claim 9 wherein the densities of the primary pigment particles and the filler particles are matched to that of the dielectric solvent or solvent mixture in which the two types of the particles are dispersed.

11. The composition of Claim 1 wherein said filler particles are small enough to be filled in the interstices of the primary particles.

30 12. The composition of Claim 11 wherein the ratio of the average particle size or diameter of the filler particles to that of the primary pigment particles is in the range of about 1/30 to about 1/5.

13. The composition of Claim 12 wherein the ratio of the average particle size or diameter of the filler particles to that of the primary pigment particles is in the range of about 1/15 to about 1/8.

14. The composition of Claim 1 wherein the primary pigment particles have an average diameter of about 0.2 to about 5 microns and the filled particles have an average diameter in the range of about 0.007 to about 1 microns.

5 15. The composition of Claim 14 wherein the filler particles have an average diameter in the range of about 0.013 to about 0.63 microns.

16. The composition of Claim 1 wherein the difference in the electrophoretic velocity of the two types of particles is less than about 30% of the average velocity of the primary pigment particles.

10 17. The composition of Claim 16 wherein the difference in the electrophoretic velocity of the two types of particles is less than about 20% of the average velocity of the primary pigment particles.

18. The composition of Claim 1 wherein said filler particles has a refractive index significantly different from that of the primary particles.

15 19. The composition of Claim 18 wherein the refractive index difference between the two types of particles is greater than 0.2.

20. The composition of Claim 18 wherein the refractive index difference between the two types of particles is greater than 1.

20 21. The composition of Claim 6 wherein the filler particles is colorless or white.

22. The composition of Claim 1 wherein said filler particles are formed from a material selected from a group consisting of PMMA latex or dispersion, glass beads, ZnO, BaSO₄ and silica.

25 23. The composition of Claim 1 wherein said filler particles are crosslinked polymer particles or polymer-coated silica particles.

24. The composition of Claim 1 wherein the volume ratio of the filler particles to the primary particles is in the range of about 5/95 to about 40/60.

25. The composition of Claim 24 wherein the volume ratio of the filler particles to the primary particles is in the range of about 15/85 to about 30/70.

30 26. The composition of Claim 1 wherein said dielectric solvent is a halogenated solvent.

27. The composition of Claim 26 wherein said halogenated solvent is a perfluorinated solvent.

28. The composition of Claim 1 wherein said filler particles comprise a perfluorinated polymeric dispersant or charge controlling agent.

29. The composition of Claim 28 wherein said perfluorinated polymeric dispersant or charge controlling agent is chemically bonded onto the filler particles.

5 30. An electrophoretic display comprising display cells filled with a bi-modal electrophoretic composition which comprises a dispersion of two types of particles of substantially the same polarity and substantially the same electrophoretic mobility or switching rate in a dielectric solvent or solvent mixture wherein one type of said particles is the primary pigment particles and the other
10 type is the filler particles of a smaller size.

31. The electrophoretic display of Claim 30 which is driven by an up/down switching mode.

32. The electrophoretic display of Claim 30 which is driven by an in-plane switching mode.

15 33. The electrophoretic display of Claim 30 which is driven by a dual switching mode which includes both the in-plane and up/down switching modes.